

Remarks

Rejections on the Basis of Obviousness Type Double Patenting

Attached hereto are appropriate Terminal Disclaimers with respect to co-pending Application Nos. 09/829,624 (now US Patent No. 6,509,291), 09/829,640 and 09/829,625 to obviate grounds for rejection on the basis of Obviousness Type Double Patenting, relating to each of said co-pending applications.

Rejections Under 35 U.S.C. 112, second paragraph.

Claims 1 and 12 have been amended to make clear what happens when the hydrocarbon feedstock is contacted with the catalyst. As stated in the first paragraph on page 3 of the instant specification, sulfur compounds in the hydrocarbon feedstock are decomposed. Claims 1 and 12 succinctly recite that taking place.

Rejections under 35 U.S. C. 103(a)

Please see attached "Amended Claims".

Claims 1 and 12 have been amended by limiting the sulfur content of the feed to a value between about 150 ppm and about 500 ppm (on the basis of original claims 6 and 17, respectively) and by limiting the sulfur content of the product to a value below about 50 ppm (on the basis of original claims 2 and 13, respectively).

Claims 23 and 26 have been amended by limiting the sulfur content of the effluent from contact with the first catalyst to a value of less than about 500 ppm (on the basis of page 16, line 11) and the sulfur content of the product to a value below about 50 ppm (on the basis of page 15, line 15).

The combination of EP-0870817 A1 (Gerritsen) with the Takahashi references, US 4,845,086 and EP-0357295 A2, would not lead to the instantly claimed invention. More in particular, in claim 1 and 12, the feedstock is required to have a sulfur content between about 150 and about 500 ppm. In Gerritsen, the feedstock has a sulfur content of 1000 ppm (0.1 wt.%) or more of sulfur, preferably 2000-25000 ppm (0.2-2.5 wt.%), more preferably 5000-20000 ppm (0.5-2.0 wt.%) (page 2, lines 50-51).

In the Takahashi references, the feedstock has a sulfur content of 16,100 ppm (1.61 wt.%) (US 4,845,068, col. 5, line 30 and EP 289211, page 5, line 21). In EP 357 295, the feedstock has a sulfur content of 11,300 ppm (1.13 wt.%) (page 9, line 25). Accordingly, there is no way in which the combination of Gerritsen with one or more of the Takahashi references could lead to the process of claims 1 or 12.

For claims 23 and 26, the product of the first step, which is the feed for the second step, is required to have a sulfur content below about 500 ppm while the product of the second step is required to have a sulfur content below about 50 ppm. At least the catalyst used in the second step contains an S-containing additive.

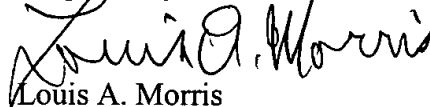
Gerritsen describes a two-step process for producing a material with a sulfur content of below 500 ppm, preferably less than 350 ppm, optionally less than 200 ppm (page 4, lines 10-12). No information is given on the sulfur content of the effluent of the first catalyst, but, given the sulfur content of the final product it is highly unlikely that the sulfur content of the first step will be below 500 ppm. Additionally, a sulfur content of the final product below 50 ppm is not disclosed in Gerritsen. As the Takahashi references all describe feed sulfur contents of above 10,000 ppm, and conversion levels of about 90% maximum, this will lead to a product sulfur content of about 1000 ppm, which is a factor 20 higher than the product sulfur content obtained in the instantly claimed invention.

Accordingly, there is no way in which the combination of Gerritsen with one or more of the Takahashi references could lead to the process of claims 23 or 26.

In fact, the combination of references sought by the Examiner does not even provide a *prima facie* case for obviousness of the present invention. To state such a case the prior art must provide suggestion or motivation to those of ordinary skill in the art to make the necessary combination, for there to be a reasonable expectation of success of the combination and for the references, when combined, to teach or suggest all the claim limitations (MPEP 2143). The limitations of the instant claims are such an order of magnitude different that those of the cited references, that the references, neither alone nor in combination, could rightly be said to teach or suggest all the limitations of the instant claims.

All grounds for rejection have been addressed and obviated.
Applicants respectfully request that the instant application proceed to issue.

Respectfully submitted,



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AMENDED CLAIMS

1. (currently amended) A process for reducing the content of sulfur compound~~content of~~ in a hydrocarbon feedstock having an initial boiling point of not less than about 100°C and a 95% boiling point of about 450°C or less and a sulfur content ~~not greater than about 2 wt. %~~ between about 150 ppm and about 500 ppm to a sulfur content of less than about ~~200~~ 50 ppm, comprising contacting said feedstock with a catalyst comprising a Group VIB metal component, a Group VIII metal component, and an S-containing organic additive at a temperature from about 200 to about 450°C, a hydrogen partial pressure from about 5 to about 200 bar, a liquid hourly space velocity from about 0.1 to about 10 vol./vol.h and an H₂/oil ratio from about 50 to about 2000 NI/l, thereby decomposing said sulfur compounds.
2. (canceled)
3. (original) The process of claim 1, wherein the S-containing organic additive is a mercaptocarboxylic acid represented by the general formula HS-R1-COOR, wherein R1 stands for a divalent hydrocarbon group with 1 to about 10 carbon atoms and R stands for a hydrogen atom, an alkali metal, an alkaline earth metal, ammonium, or a linear or branched alkyl group having 1 to about 10 carbon atoms.
4. (canceled)
5. (canceled)
6. (canceled)

7. (original) The process of claim 1, wherein said feedstock is contacted with said catalyst at a temperature from about 280 to about 430°C.

8. (original) The process of claim 1, wherein said hydrogen partial pressure is from about 10 to about 100 bar.

9. (original) The process of claim 1, wherein said hydrogen partial pressure is from about 15 to about 60 bar.

10. (original) The process of claim 1, wherein said liquid hourly space velocity is from about 0.5 to about 4 vol./vol.h.

11. (original) The process of claim 1, wherein said H₂/oil ratio is from about 80 to about 1000 NI/l.

12. (currently amended) A process for reducing the content of sulfur compound ~~content of~~ in a hydrocarbon feedstock having an initial boiling point of not less than about 100°C and a 95% boiling point of about 450°C or less and a sulfur content ~~not greater than about 2 wt. %~~ between about 150 ppm and about 500 ppm to a sulfur content of less than about ~~200~~ 50 ppm, comprising contacting said feedstock with a catalyst at a temperature from about 200 to about 450°C, a hydrogen partial pressure from about 5 to about 200 bar, a liquid hourly space velocity from about 0.1 to about 10 vol./vol.h and an H₂/oil ratio from about 50 to about 2000 NI/l, said catalyst comprising a Group VIB metal component, a Group VIII metal component, and an S-containing organic additive, said catalyst being subjected to a sulfidation step and/or activation step before contact with said feedstock, thereby decomposing said sulfur compounds.

13. (canceled)

14. (original) The process of claim 12, wherein the S-containing organic additive is a mercaptocarboxylic acid represented by the general formula HS-R1-COOR ,
wherein R1 stands for a divalent hydrocarbon group with 1 to about 10 carbon atoms and R stands for a hydrogen atom, an alkali metal, an alkaline earth metal, ammonium, or a linear or branched alkyl group having 1 to about 10 carbon atoms.
15. (canceled)
16. (canceled)
17. (canceled)
18. (original) The process of claim 12, wherein said feedstock is contacted with said catalyst at a temperature from about 280 to about 430°C.
19. (original) The process of claim 12, wherein said hydrogen partial pressure is from about 10 to about 100 bar.
20. (original) The process of claim 12, wherein said hydrogen partial pressure is from about 15 to about 60 bar.
21. (original) The process of claim 12, wherein said liquid hourly space velocity is from about 0.5 to about 4 vol./vol.h.
22. (original) The process of claim 12, wherein said H_2 /oil ratio is from about 80 to about 1000 NI/l.
23. (currently amended) A two-step process for converting a starting feedstock having an initial boiling point of not less than about 100°C and a 95% boiling point of about 450°C or less and having a sulfur content of above about 0.1 wt.%

and not greater than about 2 wt.% into a product having a sulfur content of about ~~200~~50 ppm or less, wherein the process comprises contacting said feedstock with a first catalyst followed by contact with a second catalyst, both catalysts comprising a Group VIB metal component and a Group VIII metal component, with at least said second catalyst additionally comprising an S-containing organic additive, the conditions for said contact with both catalysts being the same or different and comprising a temperature from about 200 to about 450°C, a hydrogen partial pressure from about 5 to about 200 bar, a liquid hourly space velocity from about 0.1 to about 10 vol./vol.h and an H₂/oil ratio from about 50 to about 2000 NI/l, the effluent from contact with said first catalyst having a sulfur content of less than about 0.1 wt.% ~~500~~ 500 ppm, and the product after contact with the second catalyst having a sulfur content of less than about ~~200~~50 ppm.

24. (original) The process of claim 23, wherein the effluent following contact with said first catalyst is contacted with said second catalyst after fractionation or intermediate phase separation.
25. (original) The process of claim 23 wherein the first catalyst comprises molybdenum as Group VIB metal component and cobalt and/or nickel as Group VIII metal component, while the second catalyst comprises molybdenum as Group VIB metal component and nickel as Group VIII metal component.
26. (currently amended) A two-step process for converting a starting feedstock having an initial boiling point of not less than about 100°C and a 95% boiling point of about 450°C or less and having a sulfur content of above about 0.1 wt.% and not greater than about 2 wt.% into a product having a sulfur content of about ~~200~~50 ppm or less, wherein the process comprises contacting said feedstock with a first catalyst followed by contact with a second catalyst, the conditions for said contact with both catalysts being the same or different and comprising a temperature from about 200 to about 450°C, a hydrogen partial pressure from about 5 to about 200 bar, a liquid hourly space velocity from about 0.1 to about 10 vol./vol.h and an

H₂/oil ratio from about 50 to about 2000 NI/l, the effluent from contact with said first catalyst having a sulfur content of less than about ~~0.1 wt. %~~ 500 ppm, and the product after contact with the second catalyst having a sulfur content of less than about ~~200~~ 50 ppm, both of said catalysts comprising a Group VIB metal component and a Group VIII metal component, with at least said second catalyst additionally comprising an S-containing organic additive, said first catalyst and/or said second catalyst being subjected to a sulfidation step and/or activation step before contact, respectively, with said feedstock or contact with the effluent from contact with said first catalyst.

27. (original) The process of claim 26, wherein the effluent following contact with said first catalyst is contacted with said second catalyst after fractionation or intermediate phase separation.
28. (original) The process of claim 26 wherein the first catalyst comprises molybdenum as Group VIB metal component and cobalt and/or nickel as Group VIII metal component, while the second catalyst comprises molybdenum as Group VIB metal component and nickel as Group VIII metal component.